Ann. Natal Mus. Vol. 18 (2) Pages 417—423 Pietermaritzburg September, 1966

A review of the Natal green snake, Philothamnus natalensis (A. Smith), with a description of a new subspecies

by

Donald G. Broadley

(National Museums of Rhodesia: Umtali Museum)

SYNOPSIS

The Natal Green Snake (*Philothamnus natalensis*) has two races, distinguished by the presence or absence of keels on the subcaudals.

The revival of *Chlorophis* as a full genus is unacceptable and it is proposed that the closely related Keeled Green Snakes should be placed in a single genus, *Gastropyxis* Cope becoming a synonym of *Hapsidophrys* Fischer.

INTRODUCTION

When Sir Andrew Smith described *Philothamnus natalensis* from "Port Natal" in 1840, he made the following statement: ". . . the abdominal plates are slightly keeled towards each extremity, the subcaudal scales more strongly towards their outer end." Many snakes were identified as *Philothamnus* (or *Chlorophis*) *natalensis* during the next 120 years, but they nearly all differed from Smith's description in having smooth subcaudals, a discrepancy which was overlooked. The type was unfortunately lost (FitzSimons, 1937), so Boulenger (1894) regarded *natalensis* as a species with smooth subcaudals and placed it in the genus *Chlorophis*, subsequently regarded as a subgenus by Loveridge (1958) and FitzSimons (1962).

In 1962 I collected several specimens of *P. natalensis* with strongly keeled subcaudals at low altitudes in Mozambique, and it was initially assumed that they represented an undescribed race. All the material in the British Museum (examined in 1963), including a "Port Natal" topotype, appeared to have smooth subcaudals (several of the older specimens are in very poor condition). When the material in the South African Museums was assembled, a second topotype was found to have keeled subcaudals. Reference to Smith's original description showed that this specimen resembled the type of *natalensis* and that the snakes with smooth subcaudals required a new name. It is most unfortunate that Smith's type locality happens to be the meeting place of the two forms.

This study is based upon the examination of 80 specimens of *Philothamnus natalensis*, plus data for five more in the Museum of Comparative Zoology, Harvard. In the lists of material the following abbreviations are used: AM = Albany Museum; BM = British Museum (Nat. Hist.); EBM = Marine Biological Station, Inhaca Island, Mozambique; MCZ = Museum of Comparative Zoology; NKW = Kruger National Park Collection; NM = Natal Museum; NMSR and UM = National Museums of Rhodesia (Umtali Museum); PEM = Port Elizabeth Museum; SAM = South African Museum; TM = Transvaal Museum.

Ventral counts have been made according to the system proposed by Dowling (1951).

No attempt has been made to give a complete synonymy, which is provided by both Loveridge (1958) and FitzSimons (1962); most of the material has been re-examined and literature citations for specimens from the eastern Transvaal and northern Natal cannot be positively identified. On the distribution map, hollow symbols denote literature records for which the subspecies is reasonably certain.

SYSTEMATIC DISCUSSION

Philothamnus natalensis natalensis (A. Smith)

Dendrophis (*Philothamnus*) *natalensis* A. Smith, 1840, Ill. Zool. S. Africa, Rept., pl. lxiv, figs. 1-3: "Port Natal" = Durban, South Africa.
Chlorophis natalensis FitzSimons, 1937, p. 262.
Philothamnus natalensis FitzSimons (part), 1962, p. 150.

Material examined. Mozambique: Xiluvo—UM. 6569; Dondo—UM. 6568; Manga—UM. 8600; Beira—UM. 3703; 5 mls E of Mapulanguene—TM. 29436; Chimonzo—TM. 29393; Masieni—TM. 9503; Inhaca Island—UM. 3202, TM. 5492, 24587, EBM. 1, 2, 3. *Rhodesia:* Sabi-Lundi Confluence—UM. 4744. *Transvaal:* Limpopo-Levubu Confluence—NKW. 200, 201; Bangu Gorge—NKW. 70. *Natal:* Ubombo—TM. 13679; Gwaliweni Forest (intergrades)—TM. 27207, 27210; Durban—PEM. 1450/34.

Description. Preocular 1; postoculars 2 (3 on one side only of 2 snakes); temporals 2+2 (1+2+2 on one side of 1 snake; 2+1+2 on both sides of 1 snake); upper labials 8—9, the fourth and fifth or fifth and sixth (fourth, fifth and sixth on one side of a Beira snake) entering the orbit; lower labials 9—11, the first 4—6 in contact with the anterior sublinguals. Dorsal scales feebly keeled posteriorly in 15—15—11 rows; supracaudals feebly keeled; ventrals feebly keeled laterally, 159—178 (mean 167·6, standard error ± 2·2) in ♂♂ and 156—182 (169·1 ± 2·1) in ♀♀; anal divided; subcaudals strongly keeled, 116—130 (123·8 ± 1·8) in ♂♂ and 108—120 (114·3 ± 1·6) in ♀♀. Dentition (based on 3 skulls)—maxillary 19—23, increasing in size posteriorly; palatine 13—16; pterygoid 23—30; dentary 18.

Colour pattern. Snakes from mainland Mozambique are pale green, juveniles have black cross-bars on the anterior third of the body, but these markings are hardly discernible on large adults. Specimens from Inhaca Island and Natal are uniform bright green.

Size. Largest ♂ (TM. 29436 from 5 mls E of Mapulanguene, Mozambique) 1002 (645+357) mm. Largest ♀ (NKW. 70 from Bangu Gorge, Kruger National Park) 1120 (760+360) mm.

Habitat. Taken in secondary growth scrub between the beach and a swamp at Beira (formerly heavy coastal forest), where it is sympatric with *Philothamnus hoplogaster*, *P. i. irregularis* and *P. s. semivariegatus.* Collected in woodland at Dondo and Xiluvo. *P. n. natalensis* is the only species of *Philothamnus* so far recorded on Inhaca Island, which has extensive fresh-water swamps.

Distribution. Central and southern Mozambique and adjoining parts of Rhodesia, Transvaal and Natal below 1,000 feet.

Philothamnus natalensis occidentalis subsp. n.

Chlorophis natalensis Boulenger, 1894, p. 95.
Philothamnus natalensis Loveridge, 1958, p. 98; FitzSimons (part), 1962, p. 150.

Holotype. UM. 4554, an adult ♀ from Camperdown, Natal, collected by B. G. Donnelly on 4th October, 1962.

Paratypes (63). Transvaal: Sabie—TM. 5478, NMSR. 5471; Selati—TM. 5475-6, MCZ. 21311; Woodbush—TM. 5477; Pretoria—TM. 5479, 5486; Haenertsburg—TM. 5481; Zandfontein—TM. 5483; Belfast—TM. 5487; Doornkop—TM. 5489; Lydenburg—TM. 5490, 21462, SAM. 482; Pienaars River—TM. 5488; Hennops River—TM. 5491; Kosterfontein—TM. 10062; Leydsdorp—TM. 13250; Sabie River—TM. 28774. Natal: without precise locality—SAM. 1745, MCZ. 3653; "Port Natal"—BM. 1858.4.11.1; Pietermaritzburg—NM. 327, 505, 968; Giants Castle—NM. 358, TM. 5485; Claridge—TM. 363; Umzimkulu—NM. 500; Howick—NM. 967; Royal Natal National Park (Drakensberg)—NM. 1082, BM. 1953.1.1.4; Sweetwaters—NM. 1138; Vryheid—TM. 5482, 12618; Cathkin Peak—TM. 21271; Greytown—UM. 8706; Amanzimtoti—UM. 8708. Cape Province: without precise locality—BM. 1862. 9.2.27, 1878.10.12.23; "Orange River"—BM. 1865.7.27.5; King William's Town—BM. 1876.11.9.4, 1877.8.8.6; Port Elizabeth—BM. 1887.12.6.9., PEM. 1433/83, SAM. 8647, 9143; East London—TM. 5484; Grahamstown—AM.——; Dunbrody—AM. 5465; Mquanduli—AM. 5783; Alice—PEM. 1442/24, 1450/6; Kimberley (?)—SAM. 1995; Port St. Johns—SAM. 6014, 6016, MCZ. 42635-7; Transkei—SAM. 2005-6, 2010.

Diagnosis. A south-western race, differing from the typical form in its smooth subcaudals.

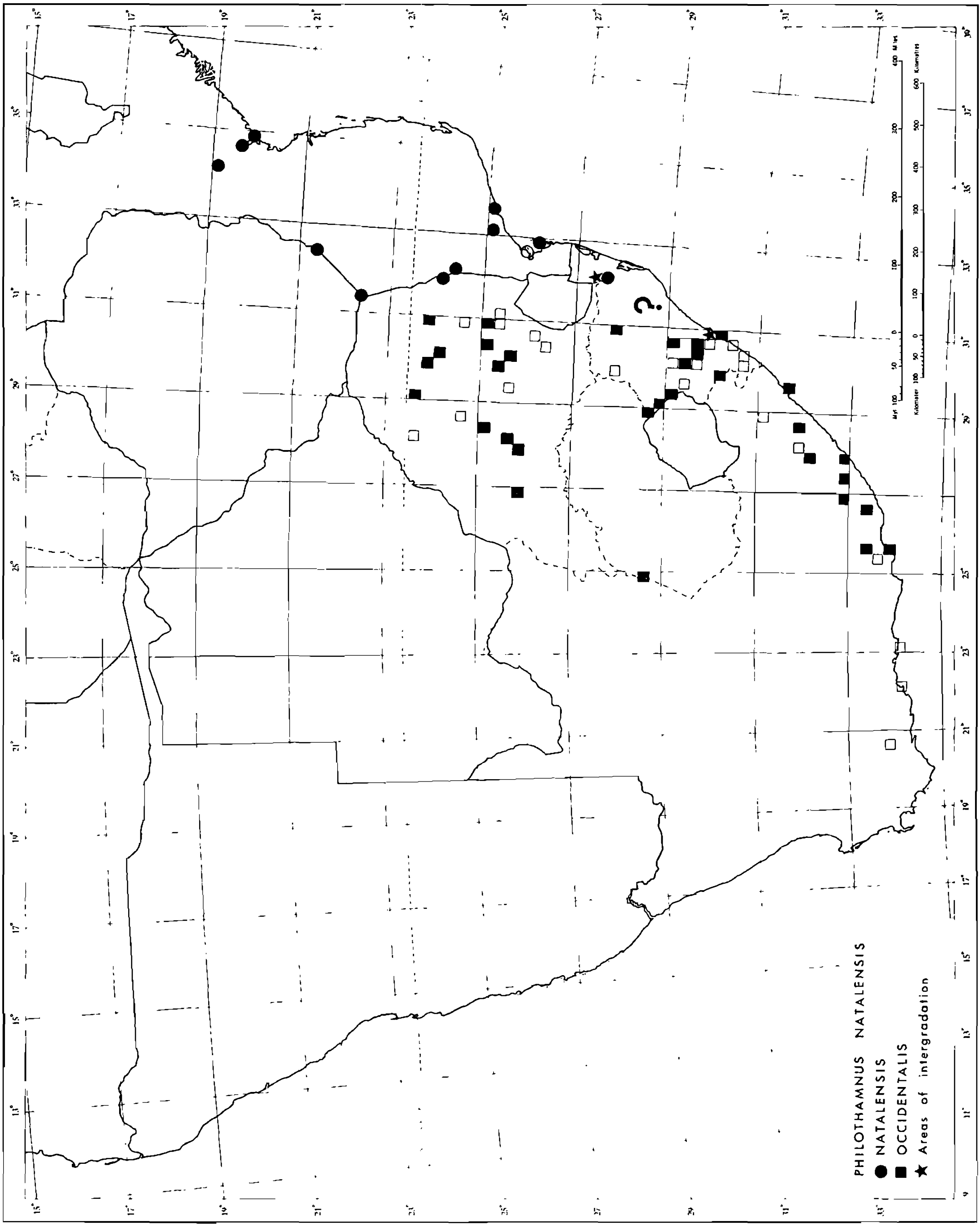
Description (Paratype variations in parenthesis). Preocular 1 (2 in 2 Transvaal snakes); postoculars 2 (3 in 1 Transvaal snake); temporals 2 +2 (rarely 1 + 1, 1 + 2, 2 + 1 or 2 + 3); upper labials 8 (8 — 9), the fourth and fifth (or fifth and sixth; fourth, fifth and sixth in a Greytown snake) entering the orbit; lower labials 10 (8—11), the first five (3—6) in contact with the anterior sublinguals. Dorsal scales smooth, in 15—15—11 rows, scale row reduction formula: $15 \,\frac{\mathrm{V}+\mathrm{VI}\ (94)}{\mathrm{V}+\mathrm{VI}\ (92)}\, 13 \,\frac{\mathrm{III}+\mathrm{IV}\ (99)}{\mathrm{III}+\mathrm{IV}\ (100)}\, 11$ supracaudals smooth; ventrals 173, keeled laterally (♂♂ 154—167, mean 161·7 ± 0·6; ♀♀ 158—177, mean 167·7 ± 1·0); anal divided; subcaudals 120, smooth (♂♂ 119—135, mean 125·4 ± 1·0; ♀♀ 111—123, mean 117·8 ± 0·8). Dentition of holotype (cleaned skull)—maxillary 24, increasing in size posteriorly; palatine 16; pterygoid 32; dentary 20.

Colour pattern. Emerald green to olive green above, uniform or some scales with a white spot, interstital skin black. Below, yellow-green to greenish white.

Size. Holotype 705 (490 + 215) mm. Largest ♂ (SAM. 2010 from Transkei) 950 (615 + 335) mm. Largest ♀ (PEM. 1450/6 from Alice) 1088 (740 + 348) mm.

Habitat. Usually found in trees and bushes in the vicinity of water.

Distribution. Transvaal (south of the Zoutpansberg), Natal (except for a coastal strip from the Mozambique border to Durban) and the eastern and southern Cape Province (largely confined to a narrow coastal strip). Boulenger's 1894 record from Damaraland



Distribution of *Philothamnus natalensis*.

was based on an aberrant *P. i. irregularis* (Loveridge, 1958). Boulenger's records from Salisbury (1902) and Kafue River (1910) were probably based on *P. hoplogaster* (Loveridge, 1958). Specimens from Orange River (BM) and Kimberley (SAM) are probably accidental importations from further east (FitzSimons, 1962).

INTRASPECIFIC VARIATION

Analysis of the variation in ventrals and subcaudals shows no significant differences between the two races, although typical *natalensis* has slightly higher average ventral and lower average subcaudal counts than *occidentalis.* The great variation in ventral counts for *P. n. natalensis* is due to specimens from the periphery of the range. The highest counts are for a ♀ from Sabi-Lundi Confluence (182) and a ♂ (178) and two ♀♀ (174, 178) from the Kruger National Park. The lowest counts are for a ♀ from Durban (156) and a ♂ (159) and ♀ (162) from Zululand.

An analysis of dorsal scale row reduction patterns was made for a sample of 12 *P. n. natalensis* and 19 *P. n. occidentalis.* The reduction from 15 to 11 rows takes place in a short distance (between ventrals 79—116) and the initial reduction may involve the loss of either an upper (IV + V on 1 side; V + VI on 48 sides; VI + VII on 11 sides; in one snake the vertebral row drops out and the paravertebral rows then fuse) or a lower row (II + III on 16 sides; III + IV on 45 sides; IV + V on 1 side); often the two rows drop out almost simultaneously, giving a dorsal scale row formula with an abrupt drop from 15 to 11 rows. The scale row reduction formulae show no appreciable differences between the two races or between sexes.

The subcaudal point (numbered from the vent) opposite which the supracaudals reduce from six to four rows was determined for samples of 13 *P. n. natalensis* and 39 *P. n. occidentalis*, Table 1 below:

Table 1

	Males			*Females*		
	N	*Range*	*Mean*	*N*	*Range*	*Mean*
P. n. natalensis	4	17—25	20·9	9	7—21	14·8
P. n. occidentalis	21	11—37	24·7	18	8—33	19·3

Table 1: Subcaudal point at which supracaudals reduce from 6 to 4 rows.

The differences between the two races are at least partly correlated with lower subcaudal counts in the typical form. The differences between sexes are less than was anticipated. This character is too variable to be of taxonomic value in the present case.

The variation in upper labial formula shows a definite pattern. In *P. n. natalensis,* the usual arrangement in mainland snakes is 9, with the fifth and sixth entering the orbit, but six Inhaca Island snakes have 9 (5, 6) on 5 sides, 8 (4, 5) on 5 sides and 8 (5, 6) on both sides of one snake. In *P. n. occidentalis,* the commoner arrangement is 8, with the fourth and fifth entering the orbit, being present in 92·5% of Natal snakes and 77% of Cape Province snakes, the percentage drops to 52·5% in the Transvaal, perhaps due to introgression with typical *natalensis.*

The development of keels on the subcaudals is most pronounced in northern specimens of *P. n. natalensis*, which are hardly distinguishable from *P. s. semivariegatus* in this respect. The keels are still well marked in southern material from Inhaca Island, Ubombo and Durban, but two specimens from Gwaliweni Forest may be considered intergrades, one has moderate subcaudal keeling, but the other shows only feeble keeling on the proximal portion of the tail.

ZOOGEOGRAPHY

The northern limit of *P. n. natalensis* is not known, but it appears to be a tropical form which may be expected to occur north of the Zambezi. This race has not been found above 1,000 feet and the boundary between the two races is clearly temperature controlled. Although both races occur at Durban, typical *natalensis* is probably confined to a narrow strip at sea level, while *occidentalis* will be found on the Berea and perhaps the southern suburbs (it occurs at Amanzimtoti). *P. n. occidentalis* may be considered an eastern tropical transitional form, having a similar distribution pattern to *Typhlops bibroni* (FitzSimons, 1962) or *Bufo rangeri* and *Pyxicephalus natalensis* (Poynton, 1964).

THE STATUS OF PHILOTHAMNUS AND ALLIED GENERA

The presence or absence of keels on the subcaudals was used by Boulenger (1894) to distinguish the two genera *Philothamnus* and *Chlorophis;* Loveridge (1958), in his revision of the group, regarded the latter as a subgenus and the same arrangement was followed by FitzSimons (1962). More recently, Laurent (1964) has revived *Chlorophis* as a full genus, leaving *Philothamnus* a monotypic genus to accommodate *P. semivariegatus.* He separates the two genera thus:

Frontal little elongated, strongly narrowed towards the rear. Habits semi-aquatic. Diet chiefly amphibians. Forest and savannas .. .. .. *Chlorophis* Hallowell

Frontal very elongated, strongly narrowed towards the rear. Habits terrestrial and arboreal. Diet chiefly reptiles. Savannas .. .. *Philothamnus* Smith

The frontal varies considerably in shape and proportions in all species of *Philothamnus* but especially in *P. semivariegatus.* With regard to ecology, *P. semivariegatus* certainly occurs in drier savanna than other species and consequently feeds largely on lizards, but it is frequently found with *P. hoplogaster*, *P. i. irregularis* and *P. n. natalensis* in waterside habitats and it does then include amphibians in its diet. On the other hand, species of *Chlorophis* often occur well away from water, particularly along forest fringes, and these forms do sometimes eat lizards, including chameleons (both *Chamaeleo* and *Brookesia*). There is therefore no clear-cut distinction between the two groups and Laurent's revival of *Chlorophis* cannot be accepted.

The presence of faint keels on the posterior dorsals of *P. n. natalensis* suggests affinities with *Hapsidophrys* and *Gastropyxis.* Boulenger (1894) distinguished these two basically West African genera from *Philothamnus* simply on the basis of their strongly keeled dorsal scales. Bogert (1940) has shown that they do not differ significantly from *Philothamnus* in either dentitional or hemipenial characters. I have no experience of the Keeled Green Snakes in the field, but Captain C. R. S. Pitman (in litt.) considers that they are essentially rain forest species, whereas all species of *Philothamnus* (sensu lato), except *heterodermus*, are savanna forms which may be found on forest fringes. He has found *P. heterodermus* well outside forest, but has never found either *Gastropyxis* or *Hapsidophrys* outside this biome. Apparently these snakes, unlike many forest species, cannot survive the destruction of their normal habitat.

Although there are good grounds for keeping the Keeled Green Snakes in a separate genus, there is no justification for the retention of two monotypic genera. *Gastropyxis smaragdina* has keeled subcaudals and 20—22 maxillary teeth, but otherwise differs little from *Hapsidophrys lineata*, which has smooth subcaudals and 30—33 maxillary teeth. The present study has shown the subcaudal character to be of minor taxonomic importance within this group of colubrids and the variation in dentition is less than that found within the genus *Philothamnus* (maxillary teeth 20—40). It is therefore proposed that *Gastropyxis* Cope, 1860, be regarded as a synonym of *Hapsidophrys* Fischer, 1856.

ACKNOWLEDGEMENTS

I am grateful to Miss A. G. C. Grandison and Mr. J. J. Cravo for granting me facilities for the examination of material at the British Museum (Nat. Hist.) and the Marine Biological Station on Inhaca Island respectively. I am also indebted to the following for sending me material on loan: Mr. W. D. Haake (Transvaal Museum); Dr. R. F. Lawrence (Natal Museum); Mr. C. E. Gow (South African Museum); Mr. B. G. Donnelly (Port Elizabeth Museum); Mr. C. F. Jacot-Guillarmod (Albany Museum) and Dr. U. de V. Pienaar (Kruger National Park). Thanks are also due to Dr. E. E. Williams for the loan of Loveridge's data cards for the material in the Museum of Comparative Zoology (Harvard) and Mr. R. Parker (Durban Snake Park) for the donation of two specimens of *P. n. occidentalis.*

REFERENCES

BOGERT, C. M., 1940. Herpetological Results of the Vernay-Angola Expedition, with notes on African reptiles in other collections. *Bull. Amer. Mus. Nat. Hist.*, **77**: 1-107, 18 figs., 1 pl.

BOULENGER, G. A., 1894. *Catalogue of the Snakes in the British Museum (Natural History)*. **2**:i-xi + 1-383, 25 figs., 20 pls., London.

DOWLING, H. G., 1951. A proposed standard system for counting ventrals in snakes. *Brit. J. Herpetology*, **1**: 97-99, 1 fig.

FITZSIMONS, V. F., 1937. Notes on the Reptiles and Amphibians collected and described from South Africa by Andrew Smith. *Ann. Transvaal Mus.*, **17**: 259-274, 1 pl.

————1962. *Snakes of Southern Africa.* 1-423, 106 figs., 77 maps, 43 monochrome + 76 colour pls. Cape Town: Johannesburg.

LAURENT, R., 1964. Reptiles et Amphibians de l'Angola (Troisieme contribution). *Publ. Cult. Comp. Diam. Angola*, **67**: 11-165, 40 figs.

LOVERIDGE, A., 1958. Revision of Five African Snake Genera. *Bull. Mus. comp. Zool.* (Harvard), **119**: 1-198.

POYNTON, J. C., 1964. The Amphibia of Southern Africa. *Ann. Natal Mus.*, **17**: 1-334, 122 figs., 73 maps.

SMITH, A., 1838-49. *Illustrations of the zoology of South Africa: Reptilia.* 78 pls., App.: 1-28. London.